Food Insecurity and Childhood Obesity

Women, Infants, and the Food Environment: Influences on Food Security and Obesity

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Over the past decade there has been a new interest in neighborhood-level effects on health. The role that the local food environment—in particular, the presence of large supermarkets—plays in providing high diet quality foods to neighborhood residents is being studied. Although the proportion of meals eaten away from home has increased, families on average continue to purchase most of their food from supermarkets and grocery stores. Those families who spend more of their food dollars on at-home foods have higher diet quality than those families who spend more money on away-from-home foods. Supermarkets provide the greatest food variety at lower cost compared to restaurants. The presence of grocery stores in a neighborhood varies by neighborhood racial composition, with fewer supermarkets located in African-American neighborhoods, and by whether the neighborhood is in a rural area.

As part of an ongoing cohort study to investigate risk factors for postpartum weight retention, this study investigated the food and physical activity environments in a three-county area in central North Carolina.

The study had two objectives:

(1) To identify environmental influences on shopping behaviors, dietary intake, meal patterns, and physical activity among postpartum women, infant caregivers and infants

(2) To identify policies and social factors that influence food resource and recreation location, and to investigate the relationship between food environment and dietary intake.

Various factors make it difficult to assess the hypothesis that supermarkets have an independent influence on diet quality. First, endogeneity, or omitted variable bias, may not take into account the personal choice that influences both residence and the distance to supermarket that might influence diet quality. Second, although an independent relationship has been found between presence of a supermarket and diet, the impact of distance from a supermarket on diet is not fully understood.

Women were recruited within 1 year postpartum, primarily through clinics supporting the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). A total of 34 women participated in focus groups and individual interviews. These sessions were organized by race and Body Mass Index (BMI) status. Each focus-group interview lasted about 90 minutes and each individual interview lasted 30-45 minutes. In addition, nine interviews were conducted with community leaders including nutritionists at three WIC clinics, a manager of a convenience store, town planners, representatives from State and national nonprofit organizations that promote smart growth and active living, and State public health officials. All interviews were audiotaped, transcribed verbatim, coded, and imported into software for data management and analysis.

The open coding process produced 47 themes categorized into eight headings: neighborhood social and physical characteristics, food environment, supermarket environment, physical activity environment, individual resources, individual considerations, individual physical activity issues, and perceived societal and programmatic influences.

Preliminary findings of postpartum women's perception of their food environment, especially as it applies to a supermarket survey, suggest that food purchase decisions are affected by more than cost, quality and food variety. The general atmosphere of supermarkets, specifically cleanliness and customer service, also influences where women shop. Study participants articulated a strong preference for two of seven commonly mentioned supermarket chains in three central North Carolina counties. Women conveyed a vague sense of "fitting" with their preferred supermarkets. Stores perceived as having higher quality food also were seen as more expensive. The women were not as comfortable shopping in the more expensive stores because they either didn't feel welcome or familiar with item locations, which increased their shopping time.

Although most women shopped at large chain supermarkets, they spoke of the quality of the supermarkets differing by neighborhood wealth. Findings also suggested that individual self-esteem may confound the association of neighborhood food resources on diet and weight. Other psychosocial factors, such as anxiety and discrimination, might be important characteristics to measure, especially among low-income households. Such variables have not been included in models of the neighborhood food environment and diet.

Is There a Link Between Food Insecurity and Overweight Status in Children? Evidence from the Early Childhood Longitudinal Survey

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Recent literature indicates that close to two-thirds of the U.S. adult population is overweight or obese. Moreover, the prevalence of obesity has increased in the United States, particularly among children. This research identified literature linking obesity with increased risk of poor health outcomes, such as cardiovascular disease, diabetes, and cancer.

While there is little controversy about the proximal determinants of overweight status—imbalance between energy intake and expenditure—there is considerable complexity in the framework of distal factors that give rise to this imbalance. An emerging area of research exploring distal factors is concerned with the relationship between household food insecurity and obesity.

Several empirical studies cited in the report have explored the food insecurity-weight status relationship. There is apparent agreement among studies of adult women: most studies show a positive association between food insecurity and the probability of being overweight. While a positive relationship may seem paradoxical, several explanations are possible. Food insecurity could lead to overweight status if individuals overcompensate for periods when food is scarce, resulting in greater overall intake. Weight cycling could also make the body more efficient in utilizing dietary energy, leading to weight gain over time. Finally, energy-dense foods are often less expensive, so that food-insecure households who cannot afford to eat balanced meals or who must rely on a few kinds of low-cost foods may have an overall greater energy intake.

No clear pattern has emerged regarding the food insecurity-overweight link in children. Some authors have suggested that the issue in children is unresolved because of limitations (including sample size) of previous datasets. Literature cited in the report has found that food insecurity or hunger is associated with negative academic outcomes and poor psychosocial functioning at school, adverse health outcomes, and poor mental health. The objective of this research is to test the hypothesis that household food insecurity is positively associated with overweight status in children.

The study analyzes data collected in the Department of Education's Early Childhood Longitudinal Survey-Kindergarten Cohort (ECLS-K). The ECLS-K is a large nationally representative survey of children which began with the kindergarten class of 1998-99. The survey collected measures of children's

heights and weights twice per year in the kindergarten and first grade, the full 18-item USDA food insecurity module in the spring of 1999, and a rich set of variables on the home and school environments of these children. Algorithms from the Centers for Disease Control and Prevention (CDC) were used to assign Body Mass Index (BMI)-for-age percentiles to each child's measurements. Children with a BMI greater than or equal to the 95th percentile of their sex-specific BMI-for-age chart were considered overweight. In addition to this indicator, the study calculated a dichotomous variable indicating "risk of overweight," a CDC term for children with a BMI greater than or equal to the 85th percentile of their BMI-for-age chart.

Weight status is affected by a number of biological and socio-economic factors. To control for potentially confounding variables, the research developed multivariate logistic regression models in which the dependent variable was a dichotomous indicator of overweight status. Independent variables included a measure of household food insecurity and a full set of control variables, including: age, sex, and birth weight of the children; maternal educational attainment; income, region, and urbanization of the household; as well as family meal patterns and child activity patterns. All analyses used ECLS-K weighting variables, and accounted for the clustered nature of the sample by using jackknife replicate methods to estimate standard errors.

The primary study finding is that household food insecurity, when modeled with appropriate controls, is not associated with a higher prevalence of overweight among young school children. If anything, household food insecurity seems inversely associated with weight status. The finding is relatively robust, since similar results were demonstrated across a range of different models. The study applied dichotomous (food secure/insecure) and trichotomous (food secure/insecure without hunger/insecure with hunger) expressions of the household food security variable and also used dichotomous and trichotomous expressions for child food insecurity. Models using different expressions of the dependent variable were performed, using "risk of overweight" as an indicator in one model, and simply BMI in continuous form in another. A cross-section analysis based on data collected in the spring of the children's kindergarten year was run. It should be noted that parents reported on household status in the 12 months prior to the interview, so in effect a food-insecure condition would have preceded the children's weight status. The research further tested whether household food insecurity in the spring of 1999 was predictive of overweight status a year later and found that it was not. Additionally, the study tested whether household food insecurity in 1999 was predictive of a high weight gain over the next year and found an inverse association.

These findings may mean that food insecurity is less relevant for those whose main concern is childhood obesity than for those focused on academic and psychosocial outcomes or physical and mental health. In addition, study estimates indicated that while 10 percent of the sample overweight children came from food insecure households, 24 percent came from households in poverty. Thus, targeting overweight prevention might be more focused on a general population of the poor than on the food-insecure population. Moreover, social marketing techniques or environmental change strategies that affect large groups of people may cost less than strategies that must first identify food-insecure households.

A Cautionary Tale: Using Propensity Scores To Estimate the Effect of Food Stamps on Food Insecurity

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In 2003, the Food Stamp Program (FSP) provided assistance to 9.2 million households, including 5 million households with children. It is the largest Federal food program and is the cornerstone of Federal food assistance. FSP attempts to ensure that low-income families have sufficient resources to purchase a nutritionally adequate diet. Food insecurity is an FSP outcome measure. A module designed by the U.S. Department of Agriculture (USDA) and the Department of Health and Human Services (HHS) consists of 18 items that classify families as either food secure or food insecure. Reducing levels of food insecurity is an important goal, particularly for children: those who are food insecure are more likely to suffer from a range of academic and behavioral deficits.

The impact of the FSP on food insecurity is difficult to analyze since unmeasured or unobserved characteristics may be correlated with both program participation and food insecurity. This correlation introduces statistical bias, which may either understate or overstate program impact. Most research indicates that those who use food stamps have measurable disadvantages relative to income-eligible persons who do not participate. These disadvantages may increase the likelihood that these families are also food insecure. Simple comparisons between those who use food stamps and those eligible persons who do not may understate the program's impact if there are unmeasured disadvantages that prompt the most food insecure households to become FSP participants. However, the direction of the statistical bias may operate in the opposite direction. Eligible families who apply and participate may be better organized or otherwise advantaged in comparison to eligible nonparticipants. In that case, the program impact may be overstated.

Recent developments in nonexperimental methodology provide new techniques for evaluating a nonrandomized program such as the FSP. The use of propensity scores is one such method. Under key assumptions, propensity scores approximate a randomized experiment by creating a “matched” treatment and control group who are, save for treatment status, comparable. When the two matched groups are compared on an outcome, any resulting differences should reflect the treatment and not unmeasured characteristics. This method depends heavily on the ability to control for observed determinants of both program participation and food insecurity.

This research uses propensity scores to examine the effect of the FSP on food insecurity. Data come from the first and second waves of the Early Childhood Longitudinal Survey-Kindergarten Cohort (ECLS-K), a nationally representative dataset of over 21,000 children. Propensity scores were developed to create equivalent groups, with one receiving the treatment while the other group does not. Propensity scores represent the predicted probability of participating in the treatment, based on the observed and measured characteristics used in the prediction equation. The literature does not provide definitive guidance on how propensity scores should be calculated, so this research used several models, with each model varying the number of covariates.

The study found no effect of the FSP on the likelihood that a household will be classified as food insecure: the estimates were small and not consistent across the model specifications. As a further step, however, the study estimated the effect of food stamps on the level of food insecurity. Among households that indicated some amount of food insecurity, FSP participation reduced the amount of food insecurity.

This research makes two contributions:

(1) It uses statistically rigorous methods to evaluate the potential impact of food stamps among a sample of households with young children.
(2) The advantages and disadvantages of propensity scores are compared to more traditional linear regression models.

The use of the method is illustrated, highlighting how it may be applied in other research efforts. The study demonstrates limitations to the use of propensity scores based on their underlying assumptions. In order to help attain unbiased estimates, scores should be based on a rich array of covariates. This research found that estimates using regular linear regression methods were similar to results of the propensity score models. It is possible that a rich dataset such as ECLS-K, where many potentially confounding factors can be controlled for, could be sufficient for estimating the program's effect. Propensity scores should be used with caution. To examine the impact of a program like the FSP, where a randomized experiment cannot take place because eligible recipients cannot be denied benefits, using propensity scores in conjunction with more traditional linear regression models may provide informative results on program impact.